Shamak Dutta

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http://shamak.github.io

Research Interests

My research interests lie at the intersection of computational neuroscience and machine learning. Currently, my focus is on modeling stochastic neurons in artificial neural networks.

Education

2017–now **Masters in Systems Design Engineering**, *University of Waterloo*, Canada.
Advisors: Graham Taylor & Bryan Tripp
International Master's Student Award ($12,270 CAD)

2012–2017 **Bachelors in Computer Engineering**, *University of Waterloo*, Canada.
Engineering International Student Scholarship ($20,000 CAD)
President's Scholarship of Distinction ($2000 CAD)
President's Research Award ($1500 CAD)
GPA – 3.7/4.0, Graduated with Distinction

Publications

2018 **Convolutional Neural Networks Regularized by Correlated Noise**.
S. Dutta, B. Tripp, G. Taylor
CRV, 2018

2016 **Barcodes for Medical Image Retrieval Using Autoencoded Radon Transform**.
H. Tizhoosh, C. Mitcheltree, S. Zhu, and **S. Dutta**
ICPR, 2016

Research Experience

Summer 2017 **Research Intern**, *Morpheus Labs*, Oxford, United Kingdom.
Advisors: Joao Messias & Shimon Whiteson
I worked on recovering the 3D pose of people from a single 2D scene. This involved estimating the camera pose using known 3D-2D correspondences and iterative refinement using particle filters. Using the estimated camera pose and a well known 2D pose detector, we built a generator network to produce a 3D pose given the 2D pose. The generator learning was guided by the reconstruction loss of the produced 3D pose in 2D and a loss provided by a discriminator network whose objective was to classify 3D poses as real or fake. I also implemented Deep Q-Learning on the cartpole task from OpenAI gym using an in-house reinforcement learning framework.

Fall 2016 **Research Intern**, *A9.com*, Palo Alto, USA.
Advisor: Erick Cantu-Paz
I was part of the Amazon Search Ranking team. I implemented a tweaked version of Deep Structured Semantic Model (Huang et al, 2015) to generate word embeddings, given a query or product title. These embeddings are then used to calculate similarity scores in vector space to determine how relevant a product is, given a query. I prototyped an approximation of the Amazon ranking metric using a deep neural network which achieved significant accuracy. In addition, I gave a tutorial on implementing character-level recurrent neural networks in TensorFlow to 30 people.

Summer 2016 **Undergraduate Research**, *Adaptive Systems Lab*, University of Waterloo, Canada.
Advisor: Dana Kulic
I analysed the use of recurrent neural networks to achieve behaviour cloning of human motion on the HDM05 Motion Capture dataset. This work was done as part of ECE 499 (Independent Research Project). I wrote a final report on my experiments and results; grade - 90/100.

Summer 2016 **Undergraduate Research**, University of Waterloo, Canada.
Advisor: Stephen Smith
I worked on solving the Generalised Travelling Salesman Problem where the sets can overlap. I implemented a solver in Julia, based on large-scale adaptive neighbourhood search using various heuristics.

Fall 2015 **Undergraduate Research**, *KIMIA Lab*, University of Waterloo, Canada.
Advisor: Hamid Tizhoosh
I analysed the use of the hidden representations of deep autoencoders trained on the Radon transforms of medical images as image descriptors. The hidden representations are converted to binary barcodes using a threshold, which are used in high-performance search and retrieval. Co-author on a paper accepted at ICPR, 2016.

Work Experience

Summer 2017 **Research Intern**, *Morpheus Labs*, Oxford, UK.
Fall 2016 **Research Intern**, *A9.com*, Palo Alto, USA.
Winter 2016 **Software Engineer Intern**, *A9.com*, Palo Alto, USA.
Summer 2015 **Software Engineer Intern**, *Lookout Security*, San Francisco, USA.
Fall 2014 **Software Engineer Intern**, *Avvasi*, Waterloo, Canada.
Winter 2014 **Software Engineer Intern**, *Achievers Inc.*, Toronto, Canada.
Summer 2013 **Software Engineer Intern**, *pVelocity*, Toronto, Canada.

Courses taken (for credit or audit)

UW (Masters): Convex Optimization, Computational Neuroscience
UW (Bachelors): Machine Learning, Pattern Recognition, Quantum Mechanics, Probability Theory, Robotics & Control, Adaptive Algorithms, Networks, Analog Communications, Analog Control, Compilers, Embedded Systems

Technical Skills

Languages: Python, Java, C++
Software: TensorFlow, Julia, Matlab, Hadoop, R, PyTorch, Theano